DOCUMENT RESUME

ED 455 809 IR 020 765

AUTHOR	Sugar, William A.
TITLE	Human-Centered Design Bill of Rights for Educators.
PUB DATE	2000-10-00
NOTE	13p.; In: Annual Proceedings of Selected Research and Development Papers Presented at the National Convention of the Association for Educational Communications and Technology (23rd, Denver, CO, October 25-28, 2000). Volumes 1-2; see IR 020 712.
PUB TYPE	Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Assisted Instruction; *Computer Attitudes; Computer Literacy; *Computer Uses in Education; Educational Development; Elementary Secondary Education; Staff Development; *Teacher Attitudes
IDENTIFIERS	*Technology Integration; Technology Role

ABSTRACT

This paper presents a potential solution to encourage technology adoption and integration within schools by proposing a human-centered technology "bill of rights" for educators. The intention of this bill of rights it to influence educators' beliefs towards technology and to enable educators to confront with confidence the seemingly mesmerizing host of new technologies. The discussion includes: instructional technology in the schools--allegiance and resistance; immature and mature views of technology; incentives and obstacles for integrating technology; and beliefs about technology and its impact. The human-centered design influences in the proposed technology bill of rights for educators are discussed, followed by descriptions of the nine rights in the proposed bill of rights: "It is not your fault, it is the designers' fault"; "'Old' technology is fine to use, as long as it is effective"; "Technology will conform to my proposed needs, not designers' needs"; "I am a designer of technology, rather than a user of technology"; "Appropriate technology is redundant or impractical technology is an oxymoron"; "It is fine to make 'errors' with technology; technology will adapt to my mistakes"; "Technology is designed to solve my problems"; "Technology is designed to help me be more creative"; and "The more active a technology user I am, the more effective technology will be." Future directions are outlined. (Contains 39 references.) (AEF)

Reproductions supplied by EDRS are the best that can be made
from the original document.

M. Simonson

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

HUMAN-CENTERED DESIGN BILL OF RIGHTS FOR EDUCATORS

William A. Sugar, Ph. D.
East Carolina University

ED 455 809

It appears to be a ceaseless question on determining the best ways to incorporate technology within public schools. Though the past relationship between the Instructional Technology discipline and public schools has been tenuous and limited (Heinich, 1995), Willis, Thompson, and Sadera (1999) recently present encouraging news. They summarize the current research of a new sub-discipline within instructional technology: information technology and teacher education. This new field offers effective solutions to encourage technology adoption and integration within public schools. This article presents another potential solution by proposing a human-centered technology bill of rights for educators. The intention of this bill of rights is to influence educators' beliefs towards technology and to enable educators to confront the seemingly mesmerizing host of new technologies with confidence.

Instructional technology in the schools: Allegiance and resistance

Throughout the last century, pubic support for the use of new technologies in the classroom has been sympathetic and promising. New technological gadgets (e.g., Edison's kinetographs, instructional television, filmstrips, videocassettes, and now, DVD players, etc.) have been designated as "champions" that will help facilitate the ultimate technology integration and revolution in schools. The general public tend to view technology as being "positive" overall (Kerr, 1996). This allegiance appears to be somewhat of a blind frenzy where there is an "initial wave of enthusiasm for new technology" (Cuban, 1986, p. 4). In fact, Segal (1996) describes this phenomenon as "technological utopianism" whereas Mellon (1999) characterizes the current allegiance to technology as a worshiping act.

However, the "Field of Dreams" syndrome[4] does not apply to educational settings. Even though new technologies are proclaimed, introduced, purchased and adopted by schools, teachers are resistant to "modern" technologies and are reluctant to accept new technologies (Cuban, 1986, p. 2). In most cases, technology is "hurled" at teachers when "non-teachers" introduce and originate new technologies into schools through top-down mandates (Cuban, 1986, p. 54). This is currently the case. Public schools are well equipped with computers, but all to often teachers do not regularly use this technology in their classrooms (Cuban, 1993; Office of Technology Assessment, 1995). Though Becker (1998) reports promising news for Internet use among teachers, universal acceptance of new technologies among teachers should not be taken for granted.

Immature and mature views of technology

Despite this initial enthusiasm, reluctance, and resistance, individual teachers have successfully adopted and integrated technologies within their classrooms. However, there have been inconsistent technology adoption styles and usage among teachers (Dexter, Anderson, and Becker, 1999, p. 221; Office of Technology Assessment, 1995). These different styles can be categorized as an *immature* view of technology as opposed to a *mature* view. An immature view perceives new technology as an add-on or supplemental activity and develops routine instructional tasks (Willis & Mehlinger, 1996, p. 984). With a top-down approach, Fabry and Higgs (1997, p. 389) report that new technologies have been forced into schools which "typically results in superficial adoption rather than incorporating the substance." Ely (1997) comments that new technologies (e.g., computers) "rarely supplant other media and methods" (p. 104). A mature viewpoint of technology goes beyond this superficiality and views a particular technology as a tool to facilitate learning (Office of Technology Assessment, 1995). Thus, this new technology is not supplementing a particular curriculum, but is in the process of revolutionizing that curriculum. In fact, Ertmer (1999, p. 47) states "in general, the more integrated one's technology use becomes the more fundamental the required changes."

[4] "Field of Dreams" refers to the film with Kevin Costner. In this film, Costner's character builds a baseball park in a corn field with the expectation that people will come once the field is built.

IR020765

Still, whether a school adopts an immature or mature perspective of technology, the critical variable in the adoption and subsequent integration of a particular technology is the teacher (Fabry & Higgs, 1997; Saye, 1998). Teachers must be convinced of the feasibility of using a particular technology before this adoption and integration occurs (Office of Technology Assessment, 1995, p. 71). Teachers must perceive any possible change (technological or non-technological) as being helpful to their current duties (Saye, 1998, p. 211). Ertmer, Addison, Lane, Ross, & Woods (1999, p. 55) concur by stating, "if the computers do not teach what the teacher stresses, teaches things the teacher does not, or requires types of intelligent activity the teacher does not emphasize, it is unlikely the teacher will assign high value to its use." Quite possibly, teacher's resistance and an immature perspective towards technology could be solely dependent on teacher's acceptance. Top-down mandates will not bring about a fully technology-rich curriculum, but only teacher's individual decision and acceptance of a new technology will be the guiding force.

If it is true what Willis and Mehlinger (1996, p. 978) state as an "universal conclusion that teacher education, particularly pre-service is not preparing educators to work in a technology-enriched classroom," then we need to create the environment in which teachers can make rational decisions and accept a particular technology. In fact, Willis (1993) notes that we have moved into a new era of educational computing and a new way of asking questions about technology adoption (p. 14). We must now start asking questions about the new roles and responsibilities of a teacher and provide training to support teacher technology adoption and integration (Willis, 1993, p. 28). Fabry and Higgs (1997) note that in order to adopt a mature view of technology teachers "must also fundamentally change how they teach." (p. 388).

I take an optimistic stance and believe that we can provide an environment in which teachers can individually accept and maturely integrate technologies into their curriculums. In order to facilitate this interaction, I propose a technology bill of rights that is aimed at influencing teachers' belief system. Before this bill of rights and its principles are explicated, a summary of factors that influence and impede technology adoption, as well as a distinction between Ertmer's (1999) first- and second-order barriers must occur.

Incentives and obstacles for integrating technology

Fortunately, past research has detailed numerous incentives and obstacles towards adopting and integrating technology within schools. Table 1 summarizes these factors. Some obvious influences include tangible factors, such as additional resources, financial support, staff development, etc. Teachers need to be convinced that a particular technology will solve their problems through practical means (Cuban, 1986, p. 66). In addition to these alterations, tacit improvements need to be implemented to promote the adoption of new technologies. Some of these proposed improvements include, promoting teacher empowerment (Topp, Mortenson, & Grandgenett, 1995, p. 11); providing a comfortable atmosphere and individualized attention (Schrum & Fitzgerald, 1996); creating a comfort zone (Norum, 1997) and other similar factors. Though it may be difficult to develop a "comfort zone" for teachers using technology, these tacit changes may be more significant than providing additional resources or offering staff development technology courses. Fullan and Stiegelbauer (1991, p. 315) note that "nothing has promised so much and has been so frustratingly wasteful as the thousands of workshops and conferences that led to no significant change in practice when the teachers return to their classrooms." Fundamental technological changes could be directly linked to these tacit stimuli.

Table 1
Incentives and obstacles affecting technology adoption and integration

Incentives	Obstacles
• Adequate equipment and resources (Becker, 1994; Fabry & Higgs, 1997; Hadley & Sheingold, 1993; Office Of Technology Assessment, 1995; Topp, Mortenson, & Grandgenett, 1995)	• Lack of technology skills and knowledge (Martinez & Woods, 1995)
• Supportive environment that allows "risk taking" (Becker, 1994; Topp, Mortenson, & Grandgenett, 1995, p. 12; Willis, 1993)	• Lack of equipment (Ertmer, et. al., 1999)
• "Expectations and encouragement are vital to the infusion of technology into the educational process" (Topp, Mortenson, & Grandgenett , 1995, p. 13)	• Mismatch with classroom style (Ertmer, et. al., 1999)
• Collegiality among users (e.g., teachers) (Becker, 1994)	• Lack of staff development (Ertmer, et al., 1999; Fabry & Higgs, 1997; Office Of Technology Assessment, 1995; Topp, Mortenson, & Grandgenett, 1995)
• Smaller class sizes (Becker, 1994)	• Absence of incentive or improper incentives (Martinez & Woods, 1995)
• "Exemplary teachers were in schools that had nearly twice as many computer- using teachers (Becker, 1994, p. 303)	• Absence of environmental support (Martinez & Woods, 1995)
• Personal interest (Becker, 1994; Ertmer, et. al. (1999)	• Lack of motivation (Martinez & Woods, 1995)
• Extra time (Fabry & Higgs, 1997; Hadley & Sheingold, 1993; Office Of Technology Assessment, 1995; Schrum & Fitzgerald, 1996; Willis, 1993)	• Lack of equipment (Ertmer, et al., 1999)
• Staff development (Becker, 1994; Fabry & Higgs, 1997; Office Of Technology Assessment, 1995; Willis, 1993)	• Lack of time (Ertmer, et al., 1999; Office Of Technology Assessment, 1995)
• "Exemplary teachers simply had higher standards and greater perceived needs than did the other computer users." (Becker, 1994, p. 315)	• Lack of relevance (Ertmer, et al., 1999)
• Attempt to reach students with learning or attention problems (Ertmer, et. al., 1999)	• Lack of confidence (Ertmer, et al., 1999)
• Motivated to make lessons more interesting (Ertmer, et. al., 1999)	• Lack of funding (Fabry & Higgs, 1997; Office Of Technology Assessment, 1995)
• Preparing students for the future. (Ertmer, et. al., 1999)	• Lack of access (Fabry & Higgs, 1997; Office Of Technology Assessment, 1995)
• Staff support (Becker, 1994; Office Of Technology Assessment, 1995)	• "Innate dislike for change (especially change mandated from above) is the most basic and significant barrier to technology integration" (Fabry & Higgs, 1997, p. 388)
• Teachers must be empowered to make decisions about technology (Fabry & Higgs, 1997, p. 390)	• "Top down projects tend to fail over time." (Willis, 1993, p. 29)
• "Ownership is critical to success." (Willis, 1993, p. 29)	• Current assessment practices (Office Of Technology Assessment, 1995)
• "Follow up support and coaching is as essential to effective staff development as is the initial learning experience." (Office Of Technology Assessment, 1995, P. 30)	

Peggy Ertmer (Ertmer, 1999; Ertmer, et. al. 1999) distinguishes between these two factors as being first-order barriers and second-order barriers to technology. First-order barriers are external to the

particular environment, such as securing additional resources to learn more about a new technology. Second-order barriers are internal to the school setting and are related to one's beliefs about the use of technology. Second-order barriers "confront fundamental beliefs about current practice, thus leading to new goals, structures or roles" (Ertmer, 1999, p. 48). Ertmer notes that both of these barriers are prevalent in the challenges of technology adoption and both types of barriers need to be confronted simultaneously during the adoption process (Ertmer, 1999; Ertmer, et. al., 1999, p. 70). There is a distinct interplay between these first-order and second-order barriers. Ertmer, et al. (1999, p. 55) note that "researchers have suggested that teachers' beliefs about the role of technology in the classroom may either reduce or magnify the effects of first-order barriers" and that "second-order barriers may persist even when first-order barriers are removed" (p. 70). These intrinsic barriers towards technology are indefatigable since teachers' fundamental beliefs towards technology are more difficult to modify. However, the proper removal of these second-order barriers can be a critical variable in effective technology adoption. This elusive second-order barrier challenges the assumption that if a school provides enough tangible resources (e.g., money, computers, software, etc.), then teachers will be willing to use new technologies. This is not the case. Teachers' personal beliefs about using technology will greatly influence the use of a particular technology. Ertmer (1999, p. 51) notes that "reduction or elimination of first-order barriers allowed second-order barriers or issues to surface." The Office of Technology Assessment also notes that "many technology rich sites continue to struggle with how to integrate technology into the curriculum" (Office Of Technology Assessment, 1995, p. 30). Concentrating on shaping teachers' beliefs about using technology and removing these second-order beliefs is a critical variable during technology adoption and integration process.

Beliefs about technology and its impact

In fact, attitudes and beliefs in teaching are essential in understanding how a teacher teaches, thinks, and learns (Richardson, 1996 p. 102). Richardson (1996) states that teachers' beliefs are influenced by personal experience, experience with schooling and instruction, and experience with formal knowledge. Like technology barriers and influences in schools, teachers' beliefs and attitudes towards technology also have been documented in past studies. Several researchers note that teachers feel uncomfortable learning new technologies (e.g., Brush, 1998, p. 243; Ertmer, 1999, p. 48; Fabry & Higgs, 1997, p. 389; Schrum, 1999, p. 85). Willis (1993, p. 28) notes that "many educators feel isolated and alone" with the process of learning new technologies. Both Carr-Chellman and Dyer (2000) and Laffey and Musser (1998) found that pre-service teachers viewed new technologies as an impediment or contradictory to effectively teaching their students. Saye (1998) offers a typology of teachers' beliefs towards technology. Saye developed a continuum of two types of beliefs: accidental tourists and voyageurs. Accidental tourists seek to control and adapt technology within their existing teaching structure while voyageurs seek to use technology for a personal challenge and willing to explore and experiment with technology (Saye, 1998, p. 224). Saye (1998) found that most teachers were accidental tourists and tended to stay within their own teaching style.

Teachers' attitudes towards technology use potentially present a formidable obstacle. These beliefs impede viewing technology as a tool and promote an *immature* view about technology. That is to say, if a teacher feels apprehensive about using technology and views it as an impediment to interacting with students, it is no wonder that technology is being used exclusively as a supplement and within the teacher's existing teaching style. Alternatively, successful integration of technology changes educators' view of the teacher-student relationship and alters their teaching practices (Dwyer, 1996). Becker (1998) found that teachers who purported to have a constructivist teaching style, tended to integrate technology within their classroom. Teachers' willingness to change is a key variable in successful technology integration (Marcinkiewicz, 1994). Though both Becker (1994, p. 291) and Schrum (1999, p. 86) agree that with experience, teachers may eventually become comfortable with a particular technology, there is a missing, critical link in interacting with technology. This variable is teachers' vision about how technology should be utilized in their classrooms.

Cultivating a positive vision towards technology can be a significant factor in promoting a *mature* view of technology and viewing technology as a tool (Ertmer, 1999; Office Of Technology Assessment, 1995). Ertmer (1999, p. 54) states that "one of the important steps in achieving meaningful technology use is the development of a vision of how to use technology to achieve important educational goals." Ertmer (1999, p. 54) recommends three strategies to develop a vision, including modeling, reflection and

collaboration. In addition to these strategies, we need to go a step further by adopting a set of beliefs and fundamental principles. We can "jumpstart" teachers' positive experiences with technology by proposing a vision, a set of beliefs, and fundamental principles on the use of technology in the classroom. I attempt to encompass these values by proposing a technology bill of rights of educators. Exercising this bill of rights, teachers will become comfortable using technology, adopt a *mature* view of technology and start using technology as a tool in their classrooms.

Technology bill of rights for educators: Human-centered design influences

Summarized in Table 2, this proposed technology bill of rights for educators is directed towards teachers' use of technology and is intended to be a vehicle to change their existing beliefs (Ertmer's second-order barriers). A brief description of the primary influences of this proposal will be discussed before each of these rights is explicated. Human-centered design principles primarily espoused by Donald Norman (1988, 1993, 1998) is the main philosophy that influences this bill of rights. This human-centered stance proposes an attitudinal shift from a reactive stance to a more proactive stance towards using technology in the classroom. It requires designers of new technologies to consider the needs of their users as a primary factor in their creation. With this newly adopted human-centered attitude, teachers will more readily integrate "new" technologies, as well as "old" technologies into their teaching practices.

The term, "human-centered" is synonymous with terms such as "user-centered," "learner-centered." Essentially, all of these terms reflect the belief that designers must create products based upon that teachers can use and are upon their users' (or alternatively upon their learners' or human's) perspective. Software designers in particular have used this design philosophy and methodology as early as the 1970's (Eason, 1988). Donald Norman (1988, 1993, 1998) who originally coined the term, *human-centered design*, describes this methodology as a "process of product development that starts with users and their needs rather than with technology. The goal of product development is a technology that serves the user, where the technology fits the task and the complexity is that of the task not of the tool" (p. 185).

This philosophy assumes and acknowledges that there are obstacles to effective technology use. To remove these obstacles, designers can improve their technological products based upon their users' perspectives. To accomplish this, designers seek actual users react to initial prototypes in a lab setting. Designers then interpret these reactions

Table 2
Proposed human-centered technology bill of rights for educators

• It is not your fault, it is the designers' fault.
• "Old" technology is fine to use as long it is effective.
• Technology will *conform* to my proposed needs, not designer's needs.
• I am a designer of technology, rather than a user of technology.
• Appropriate technology is redundant or impractical technology is an oxymoron.
• The *sole* purpose of technology is to help me be more creative.
• It is fine to make "errors" with technology; technology will adapt to my mistakes.
• Technology is designed and used to solve *my* problems.
• The more active technology user I am, the more effective the technology will be.

and redesign their prototypes to better accommodate their users' needs. Human- centered designers are encouraged to "test early and often" (Nielsen, 1993).

Similar to Tripp and Bichelmeyer's (1990) rapid prototyping process, designers potentially could go through several iterations in gaining information about their users' perspectives. Eventually, designers will create an effective final product.

There are several assumptions about designers and users related to this design philosophy. One is that designers are serving users and their needs. Users are more proactive whereas designers need to be reactive to their users' requirements. Technology is expected to work effectively for its users and be

intuitive. If a particular technology does not work or is counter-intuitive, then it needs to be changed. The users do not need to be changed. Early participation from actual users is encouraged and promoted. Detected errors in early prototyping sessions are positive whereas early prototyping sessions that do not yield problems are suspect.

Proposed human-centered technology bill of rights

This bill of rights is written specifically for teachers and administrators to improve their attitude towards the use of new technologies. This transformation will lead these educators to successfully integrate these technologies in their curriculums and future classrooms. These nine rights are described below.

It is not your fault, it is the designers' fault: This principle addresses the "blame syndrome" in which educators and other users usually blame themselves if they cannot successfully operate a particular technology. For example, students in my online *Introduction to the Internet* course often apologize for not performing a particular task, such as properly uploading their web pages to a server. They tend to accept the blame for not being successful in this process. From a human-centered design perspective, this belief is fallacious. If a user cannot navigate properly through a particular technology, then part of (if not all) responsibility lies with the designer. Too often, educators blame themselves for doing something "wrong" with technology. They might have pushed the "wrong" button, typed in the "wrong" command, or clicked the "wrong" icon. This error points to the fact that the particular designer did not originally anticipate how we would use it. We were not "wrong", but our mental models (Johnson-Laird, 1983; Norman, 1986) of this process did not correspond to the designer's own mental model. Since we did not originally conceive of the particular technology, incongruent mental models are not our responsibility. It is true that educators need to learn how to use particular technologies (e.g., word processors) through proper training (e.g., books, workshops, etc.) and designers are not responsible for this instruction. However, if teachers cannot utilize a particular technology properly, then designers must accept this responsibility and redesign the next version to better fit their target audience's mental model.

"Old" technology is fine to use, as long it is effective. Too often, an erroneous belief is that the latest version of a software program or another technology is universally preferable to an older version or an older technology. But, this is not always the case. Sometimes an older technology (e.g., a chalkboard) may be more effective than its more recent counterpart (e.g., PowerPoint). If a teacher can teach an effective lesson using "old" technology (e.g., overhead projectors, chalkboard, slide projectors, etc.) then, it is acceptable to use. Why? Blindly jumping on the bandwagon to use the latest technology, especially if it is costly and potentially ineffective makes no sense.

This is especially true in the case of a high school in the southeast region of the United States. Recently, two high schools merged into one unified high school. This new high school was technologically upgraded with new computers and related equipment. Teachers in both schools were told not to bring any "old" technology to this new school. After a few weeks of this school merger, some teachers were requesting and searching for their "old" technology. Teachers were not totally resistant to this new environment, but they have successfully designed effective lessons with their "old" technology. The key word is effective, as well as efficient. As long as "old" technology is effective and efficient, it is acceptable to use. However, there is an amendment to this particular right. If "old" technology is not effective and/or efficient, then teachers must be willing to get rid of this "old" technology and replace it with a "new" technology.

Technology will conform to my proposed needs, not designer's needs: Notice this relationship. Who is conforming? Technology should conform to our needs as opposed our needs conforming to technology. If designers of a particular technology want to create a successful product, they must attempt to conform to our needs. This right is directly related to Donald Norman's human-centered motto for the twentieth-first century. Norman (1993) notes the 1933 Chicago World's Fair motto was: Science Finds, Industry Applies, Man Conforms. Norman proposes a twentieth-first century human-centered motto. It is: People Propose, Science Studies, Technology Conforms. This new motto now implies that we must be proactive in our expectations of new technology. If a technology is going to be successful and effective in schools, it now must conform to the needs of teachers, administrators, and students. We should expect nothing less from new or old technologies.

I am a designer of technology, rather than a user of technology: This right also represents a shift in perspective. Teachers are naturally "designers" rather than "users." They continually design new lessons, curriculum guides, instructional modules, etc. They rarely take the reactive stance of users in their profession. When interacting with technology, educators should adopt the proactive "designer" viewpoint as opposed to reactive "user" viewpoint. Wilson (1999, p. 16) concurs by stating that "end users [teachers] need to think like designers as well as consumers." As a "designer", teachers should expect that technology would enable them to be successful in their designer roles as instructors. Though they may be "using" a particular technology, teachers should continually ask how can this technology enable them to become a more effective "designers."

Appropriate technology is redundant or impractical technology is an oxymoron: This right is a potentially puzzling statement, but actually points to the specific nature of technology. As Ely (1997) notes, too often technology is referred to as an object (i.e., hardware, software). However, if one looks up the definition of technology, one realizes that technology is a process as opposed to an actual "thing." This particular right describes two qualities of this process. One aspect of technology is that it should be used for *appropriate* reasons. We must adopt the perspective that it is preposterous to think one would use technology for *inappropriate* reasons. True, it is conceivable for someone to use technology for inappropriate reasons (e.g., using a computer to add single digit numbers), but why? This proposed right implies that educators will utilize technology only for appropriate reasons. Otherwise, it is a waste of time. The second aspect of technology is the issue of practicality. The nature of technology is to solve practical problems. In fact, the nature of the field of Instructional Technology is to solve practical problems in instructional settings, as opposed to solving obtuse problems in instructional settings. Again, it would be a pointless activity if educators used technology to conceive of *impractical* solutions.

It is fine to make "errors" with technology; technology will adapt to my mistakes: This goes back to the issue of technology *conforming* to our needs. If there are "mistakes", then the next version must accommodate for these errors. If there is an error message for a particular technology or if something goes "wrong", then the responsibility falls directly on the shoulders of the designer who created this new technology. One of my colleagues has the following quote in her office: "technology teaches you patience." This adage embodies the frustration that most of us probably have experienced with current technology. I am sure that I have spent countless hours with a new technology (e.g., software program) when I could have done the same task in half of the time using another means. I was not making "mistakes", but learning to become more patient with this new technology. This right represents a reversal of roles. Instead of making an "error", we now must become more patient with the designers' ill-intended errors. We also must expect that designers will learn their mistakes and adapt their revised versions accordingly.

Technology is designed to solve my problems: This right directly equates technology as being a "tool.." In fact, if technology is not being used as a tool, then it probably is being misused. Technology is the means to provide practical solutions. The purpose of this "tool" is to solve problems. By adapting this stance, educators can make clear decisions on how to use a particular technology for a particular situation. If a technology is not going to solve a problem, then there is no reason to use it. Administrators should not expect all of their teachers to use a particular technology if it doesn't solve *their* problems. The emphasis is on selecting the right tool to solve a particular problem. This right will give a voice to those educators who do not feel compelled to join the latest technology bandwagon, but give them credence to make an informed decision in selecting the appropriate technology to solve their particular problems.

Technology is designed to help me be more creative: In addition to solving problems, educators should expect that their technology should facilitate creativity and to become more effective instructors. Thus, technology should be designed so that educators can be creative problem solvers. This is related to Norman's (1993) "smart, not dumb" concept. Norman notes that technology could either make us "smart" or "dumb". Technology could entrap us in a senseless stupor such as television viewers staying mesmerized in one spot for countless hours. Or technology could enable us to improve and illuminate our selves where students could interpret the Declaration of Independence from multiple perspectives. It is no question that we need to demand the latter option. If a particular technology does not make educators and subsequently, students "smart", then, there is no reason to use it.

The more active technology user I am, the more effective the technology will be: This is another quality of effective technology and related to the "smart" issue. Educators should expect to be active partners with a particular technology. One should not be "dormant" users and interact with a technology as a "page turner". Designers should create a dynamic environment where their users are engaged. In fact, "smart" users occur when they are engaged with a particular content area within a dynamic environment. With this expectation, educators not only will be active technology users, but their students also will be.

Technology bill of rights for educators: Summary

Each of these nine rights is deliberately directed towards influencing teachers' attitude toward technology use. If you consider the reasoning of each right, the cognitive rationale might be lacking. However, this was intended. The description and explanation of these rights resembled more of a "pep talk", sermon, or another similar affective oral exposition. The intent of these rights are to influence teachers' beliefs, introduce new principles on how to view technology, empathize with teachers' frustrations with technology, and inspire teachers to consider an alternative perspective of technology. A more comprehensive cognitive justification was consciously withheld in order to focus on influencing educators' affective domain.

With the assumption that effective technology adoption involves changing both attitudes and behaviors (Richardson, 1996), this proposed technology bill of rights is concentrated on influencing teacher's attitudes and consequently, changing teachers' behaviors toward technology. By changing one's attitude towards the use of technology within schools, teachers could potentially remove several obstacles towards effective technology adoption and integration. The proposed attitude shift, as reflected in this bill of rights, gives teachers the opportunity to take a fresh stance towards use the new technologies, adopt their own vision about technology, and gives them the opportunity to clearly distinguish whether they should adopt these technologies or not.

Future directions and a possible covenant

Another common quality of this proposed bill of rights is its tentativeness. This bill of rights is in its infancy stage and needs further input. Though based primarily upon human-centered design principles, no empirical studies have been conducted to evaluate the efficacy of these rights in changing teachers' attitudes in adopting and integrating technologies. There are obvious next steps for this type of evaluation. More research on teachers' existing attitudes towards technology could take place. A comparison of these existing attitudes and proposed attitudes espoused from this bill of rights can be made. From this comparison, a list of interventions could be created in order for teachers to potentially adopt this bill of rights in their own teaching practices. Then, the next question would be to distinguish which rights enable teachers to become effective technology adopters and integrators. Do any of these rights influence teachers' behaviors towards technology?

This is one strategy. Other similar strategies and input on this bill of rights are welcomed and encouraged. The main point is to further the discussion on encouraging effective technology integration and to encourage mature perspectives of technology amongst educators. Similar to the infancy of our own country, our national bill of rights was debated, discussed and altered. This latest bill of rights could be a catalyst for further discussions on how to promote effective technology adoption and integration within the public schools.

To create an environment of effective technology adoption and integration, we must focus on eliminating first-order technology barriers, as well as second-order technology barriers. Donald Norman's human-centered design philosophy could be a powerful tool in influencing educators' perspective towards technology. This human-centered technology bill of rights is a potential means to change the way teachers look at technology and its use in education. This bill of rights also could cause teachers to adopt a more mature view of technology. Adopting the principles outlined in this bill of rights could help educators to view technology as a tool as opposed to other immature perceptions. This bill of rights potentially could be a covenant between educators, administrators, and designers of technology. That is, a proclamation on how these individuals need to change their perspectives towards the use of technology in schools. In his examination of the adoption of twentieth century instructional technologies, Larry Cuban (1986, 1993)

notes that very little technology integration has occurred in schools, since the fundamental goals and understandings of education have not changed. Possibly, this bill of rights can be adopted by educators, administrators, designers and alter this trend.

References

Becker, H. (1994). How exemplary computer-using teachers differ from other teachers: implications for realizing the potential of computers in schools. Journal of Research on Computing in Education, 26(3), 291-321.

Becker, H. (1999). Internet Use by Teachers: Conditions of Professional Use and Teacher-Directed Student Use. Teaching, Learning, and Computing: 1998 National Survey Report #1 [On-line]: http://www.crito.uci.edu/TLC/FINDINGS/internet-use/startpage.htm

Brush, T. (1998). Teaching pre-service teachers to use technology in the classroom. Journal of Technology and Teacher Education, 6(4), 243-258.

Carr-Chellman, A. & Dyer, D. (2000). The pain and ecstasy: Pre-service teacher perceptions on changing teacher roles and technology. Educational Technology and Society 3(2), 96-105.

Cuban, L. (1986). Teachers and machines: The classroom use of technology since 1920. New York: Teachers College Press.

Cuban, L. (1993). Computers meet classroom: Classroom wins. Teachers College Record, 95(2), 185-210.

Dexter, S., Anderson, R. & Becker, H. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. Journal of Research on Computing in Education, 31(3), 221-239.

Dwyer, D. (1996). The imperative to change our schools. In C. Fisher, D. Dwyer, & K. Yocam (Eds.), Education and technology: Reflections on computing in classrooms. (15-33). San Francisco, CA: Jossey-Bass.

Eason, K. (1988). Information technology and organisational change. New York: Taylor & Francis.

Ely, D. (1997). Technology is the answer! But what was the question? In R. Branch & B. Minor (Eds.), Educational media and technology yearbook. (102-108). Englewood, CO: Libraries Unlimited.

Ertmer, P. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. Educational Technology Research and Development, 47(4), 47-61.

Ertmer, P., Addison, P., Lane, M., Ross, E., & Woods, D. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. Journal of Research on Computing in Education, 32(1), 54-72.

Fabry,D. & Higgs, J. (1997). Barriers to the effective use of technology in education: Current status. Journal of Educational Computing Research, 17(4), 385-395.

Fullan, M. & Stiegelbauer, S. (1991). The new meaning of educational change. (2nd edition). New York.: Teachers College Press.

Hadley, M. & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. American Journal of Education, 101(3), 261-315.

Heinich, R. (1995). The proper study of instructional technology. In G. Anglin (Ed.), Instructional technology: Past, present, and future. (2nd edition). (61-83). Englewood, CO: Libraries Unlimited.

Johnson-Laird, P. (1983). Mental models: Towards a cognitive science of language, inference, and consciousness. Cambridge, MA: Harvard University Press.

Kerr, S. (1996). Visions of sugarplums: The future of technology, education, and the schools. In S. Kerr (Ed.), Technology and the future of schooling: Ninety-fifth yearbook of the National Society for the Study of Education. (1-27). Chicago: The University of Chicago Press.

Laffey, J. & Musser, D. (1998). Attitudes of preservice teachers about using technology in teaching. Journal of Technology and Teacher Education, 6(4), 223-241.

Marcinkiewicz, H. (1994). Computers and teachers: Factors influencing computer use in the classroom. Journal of Research on Computing in Education, 26(2), 220-237.

Martinez, J. & Woods, M. (1995). The value and planned use of educational technology in higher education: Results of a faculty service needs assessment. College & University Media Review, 2(1), 25-38.

Mellon, C. (1999). Technology and the great pendulum of education. Journal of Research on Computing in Education, 32(1), 28-35.

Nielsen, J. (1993). Usability engineering. Boston, MA: Academic Press.

Norman, D. (1986). User centered system design. Mahwah, NJ: Lawrence Erlbaum.

Norman, D. (1988). The psychology of everyday things. New York: Basic Books.

Norman, D. (1993). Things that make us smart: Defending human attributes in the age of the machine. Reading, MA: Addison-Wesley.

Norman, D. (1998). Invisible computer: Why good products can fail, the personal computer is so complex and information appliances are the solution. Cambridge, MA: MIT Press.

Norum, K. (1997). Lights, camera, action! the trials and triumphs of using technology in the classroom. Journal of Technology and Teacher Education, 5(1) 3-18.

Office of Technology Assessment (1995). Teachers and technology: Making the connection. Washington, DC: U.S. Government Printing Office.

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), Handbook of research on teacher education (102-119). New York: Macmillan.

Saye, J. (1998). Technology in the classroom: The role of dispositions in teacher gatekeeping. Journal of Curriculum and Supervision, 13(3), 210-234.

Schrum, L. (1999). Technology professional development for teachers. Educational Technology Research and Development, 47(4), 83-90.

Schrum, L. & Fitzgerald, M. (1996). A challenge for the information age: Educators and the Internet. International Journal of Educational Telecommunications, 2(2/3), 107-120.

Segal, H. (1996). The American ideology of technological progress: Historical perspectives. In S. Kerr (Ed.), Technology and the future of schooling: Ninety-fifth yearbook of the National Society for the Study of Education. (28-48). Chicago: The University of Chicago Press.

Topp, N., Mortenson, R. & Grandgenett, N. (1995). Building a technology-using faculty to facilitate technology-using teachers. Journal of Computing in Teacher Education, 11(3), 11-14.

Tripp, S. & Bichelmeyer, B. (1990). Rapid prototyping: An alternative instructional design strategy. Educational Technology Research and Development, 38(1), 31-44.

Willis, J. (1993). What conditions encourage technology use? It depends on the context. Computers in the Schools, 9(4), 13-32.

Willis, J. & Mehlinger, H. (1996). Information technology and teacher education. In J. Sikula (Ed), Handbook of research on teacher education (978-1029). New York: Macmillan.

Willis, J., Thompson, A. & Sadera, W. (1999). Research on technology and teacher education: Current status and future directions. Educational Technology Research and Development, 47(4) 29-45.

Wilson, B. (1999). Adoption of learning technologies: Toward new frameworks for understanding the link between design and use. Educational Technology, 39(1), 12-16.